

Coupling of Orbit Response Measurements vs MAD calculation with Misalignments

Sep 11, 2003

1 Outline

1 A full ORM matrix

$$\begin{pmatrix} \vec{x} \\ \vec{y} \end{pmatrix} = \begin{pmatrix} M_{xx} & M_{xy} \\ M_{yx} & M_{yy} \end{pmatrix} \begin{pmatrix} \vec{\theta}_x \\ \vec{\theta}_y \end{pmatrix}$$

2 Measurements – data taken in January

Linear fitting of orbit deviation to kick angles

3 MAD calculation with misalignments data supplied by Sho

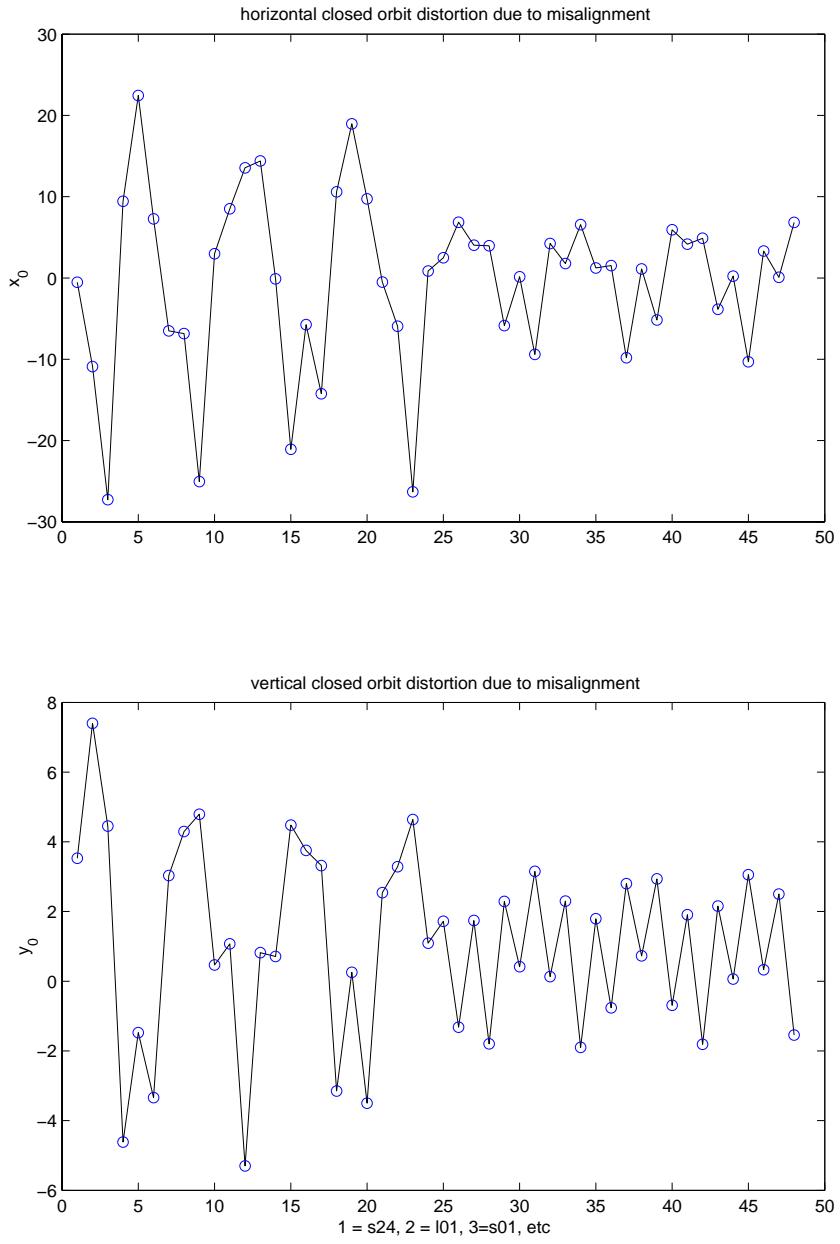
- Make a small change (0.4A) to a trim dipole, run MAD, get the distorted orbit
- Subtract the original orbit to get Δx and Δy
- $M_{xx,ij} = \Delta x_i / \theta_{x,j}$, $M_{yx,ij} = \Delta y_i / \theta_{x,j}$

2 Result

2.1 The distorted orbit

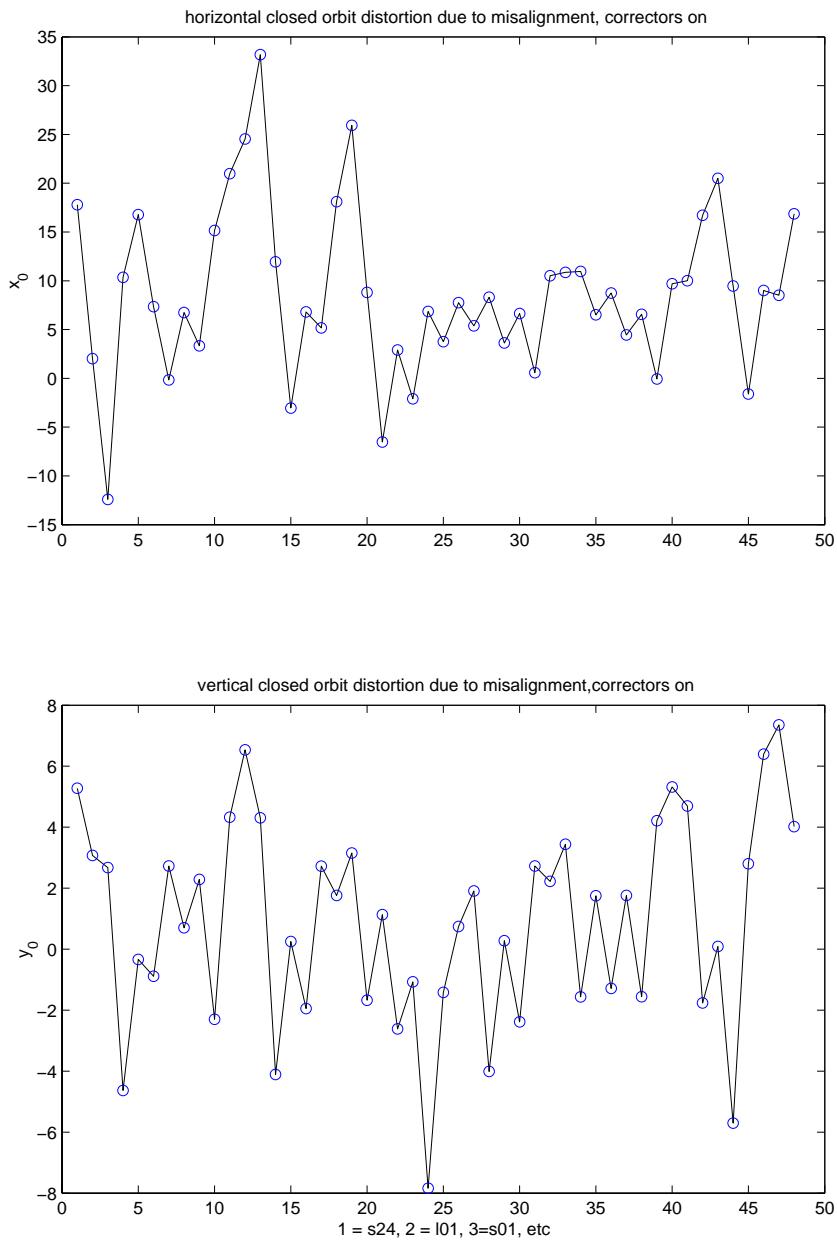
2.2 Elements of the full matrix

2.3 Coupling



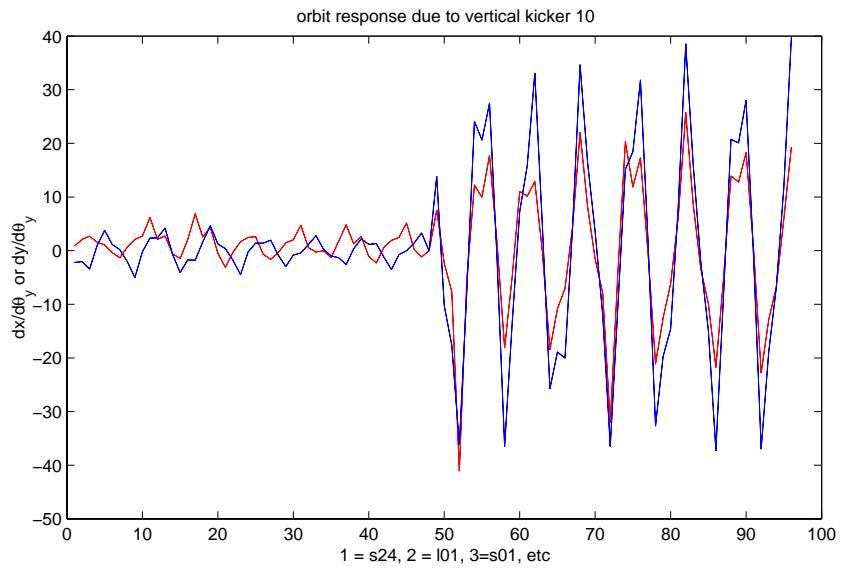
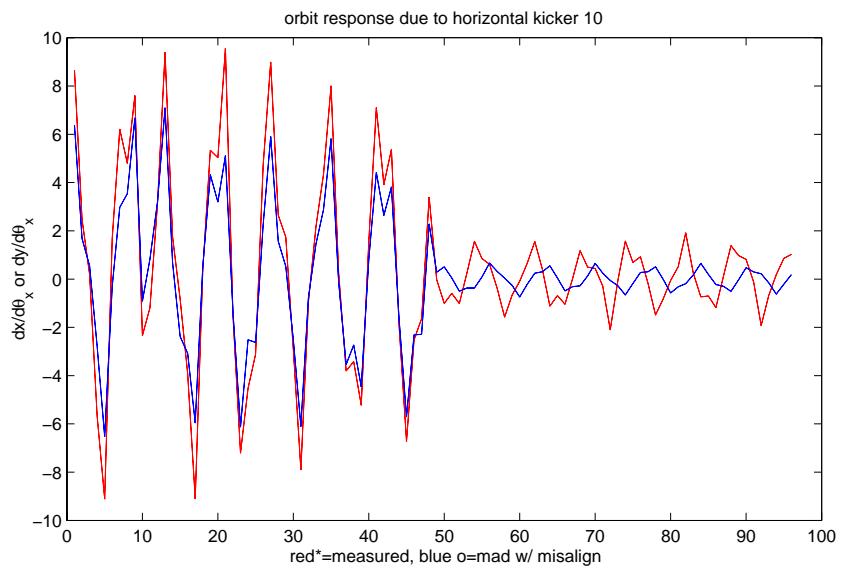
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Figure 1: The distorted orbit calculated by MAD with misalignments. All correctors off. Without misalignments, MAD gives zero distortion. Top, horizontal. Bottom, vertical.



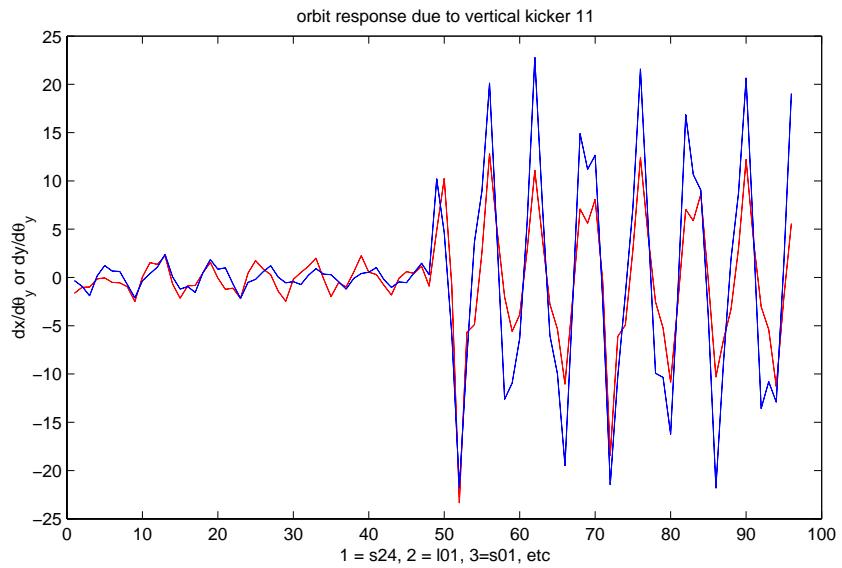
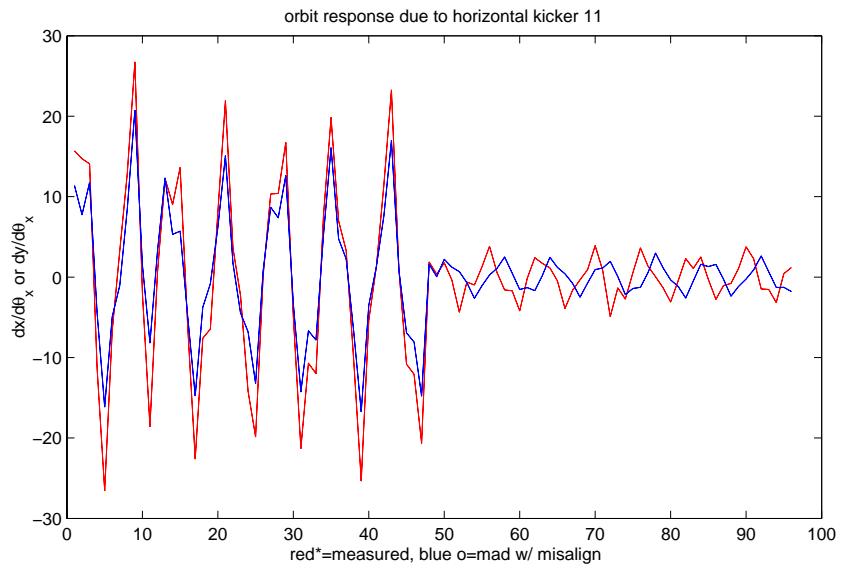
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Figure 2: The distorted orbit calculated by MAD with misalignments. All correctors on. Without misalignments, MAD gives zero distortion. This may not be compared to the measured orbit because we don't know the positions of BPM's. Top, horizontal. Bottom, vertical.



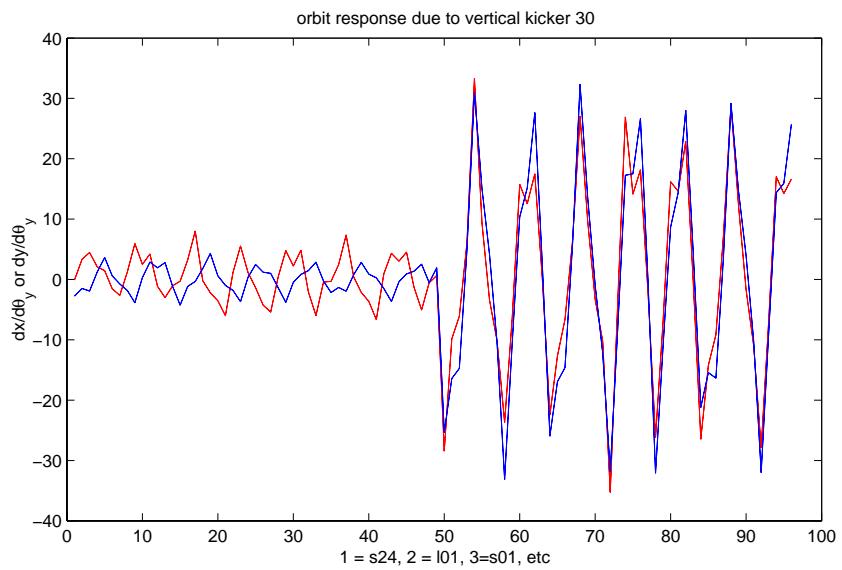
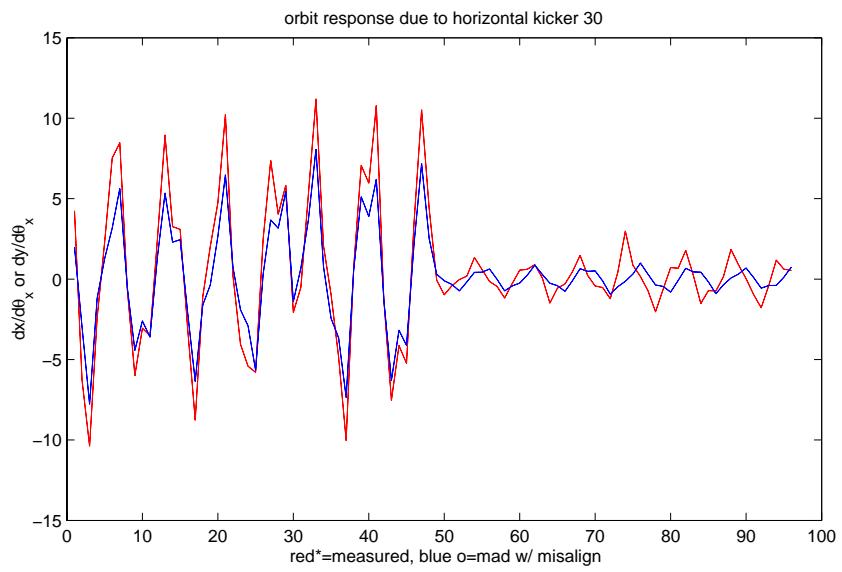
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Figure 3: The column due to trim dipoles at section L05. Red = measured, Blue = MAD calculation. Top, horizontal kicker HL05, Bottom, vertical kicker VL05.



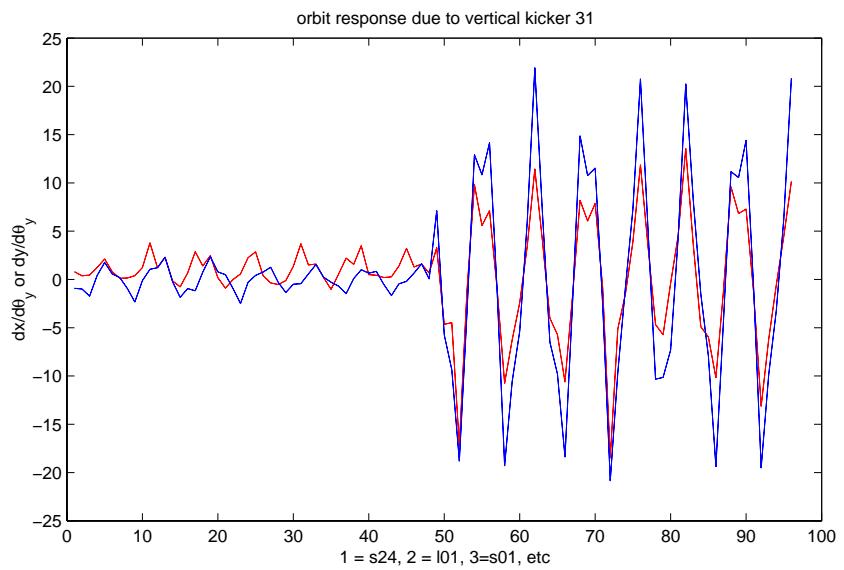
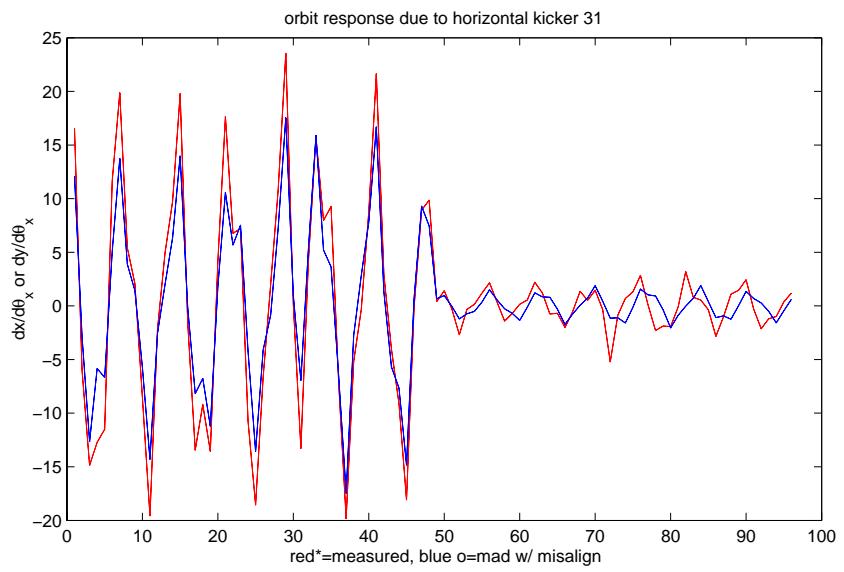
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Figure 4: The column due to trim dipoles at section L06. Red = measured, Blue = MAD calculation. Top, horizontal kicker HS06, Bottom, vertical kicker VS06



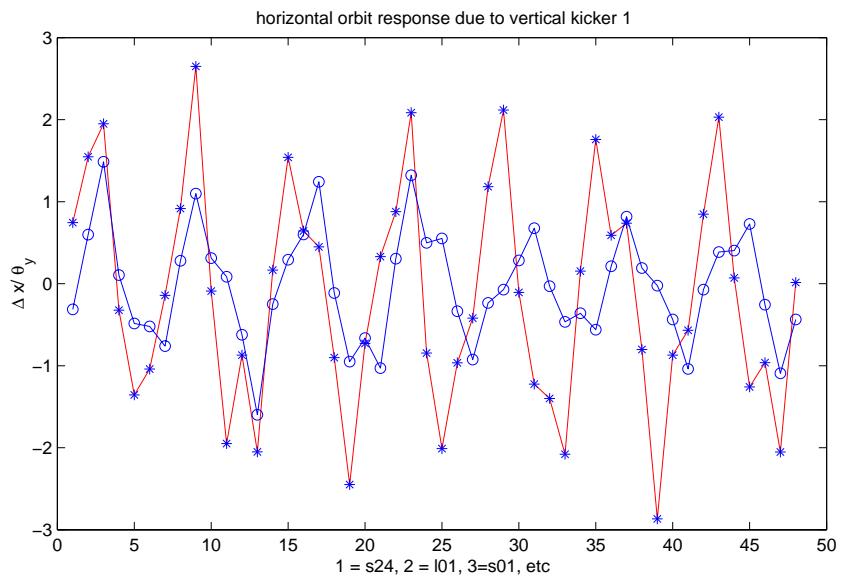
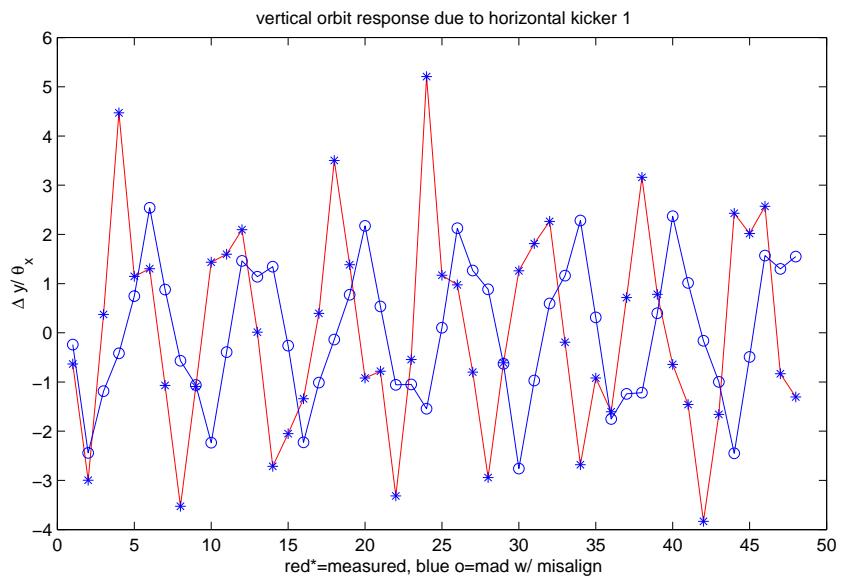
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Figure 5: The column due to trim dipoles at section L15. Red = measured, Blue = MAD calculation. Top, horizontal kicker HL15, Bottom, vertical kicker VL15



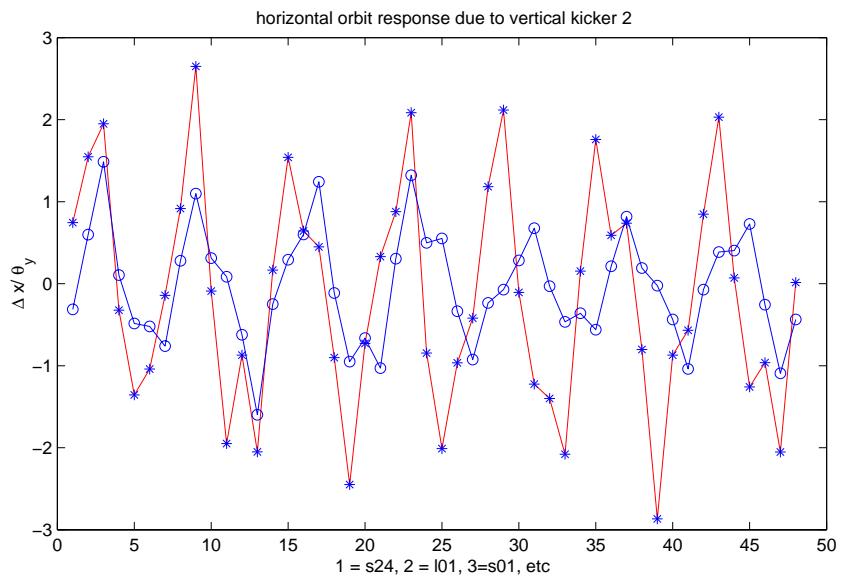
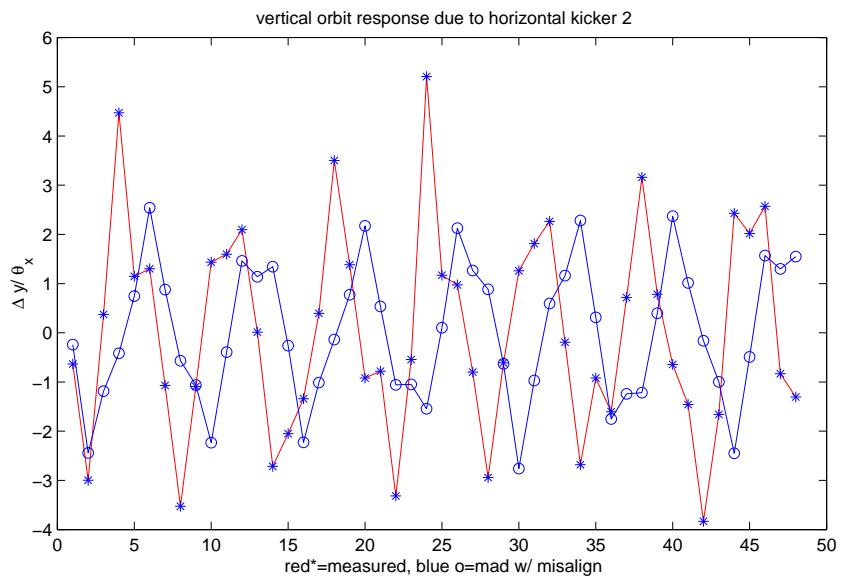
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Figure 6: The column due to trim dipoles at section S16. Red = measured, Blue = MAD calculation. Top, horizontal kicker HS16, Bottom, vertical kicker VS16



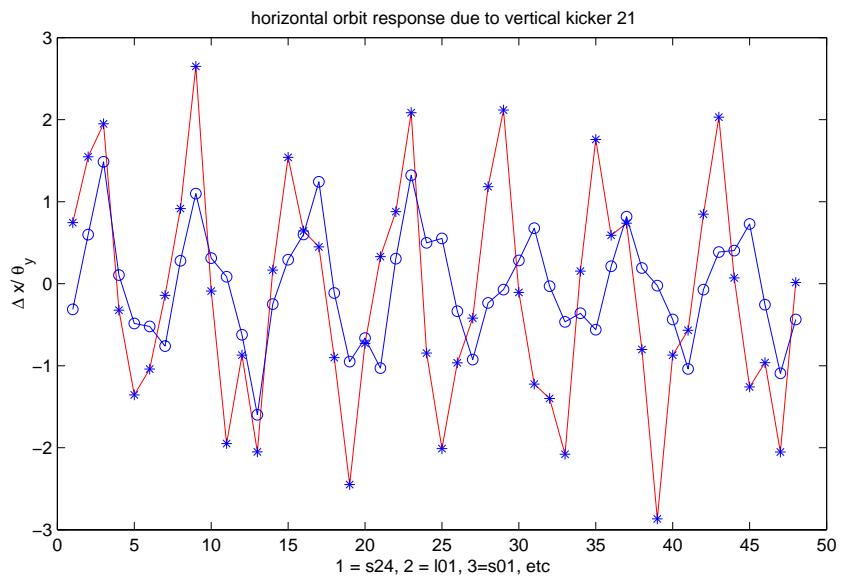
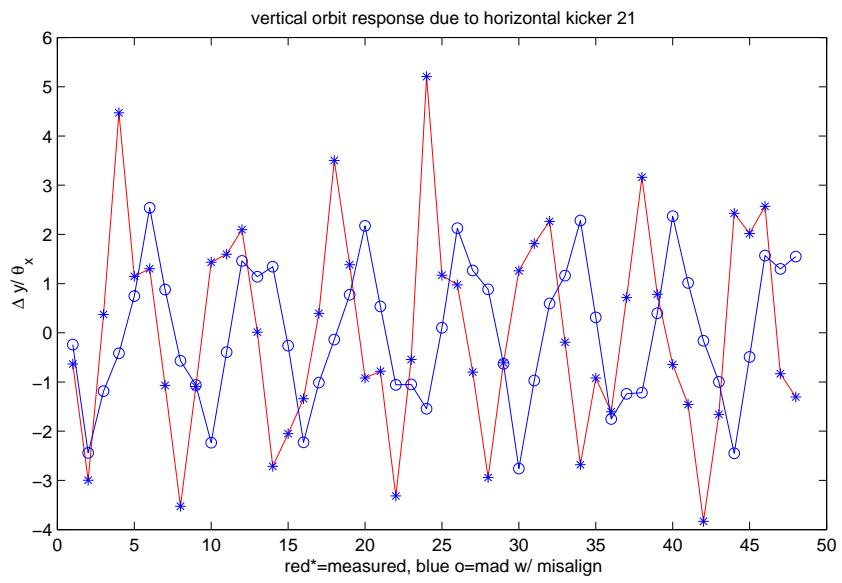
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Figure 7: Coupling of orbit response; Red * = measured, Blue o = calculated (MAD). Top, vertical orbit response due to horizontal kicker HS24, Bottom, horizontal orbit response due to vertical kicker VS24



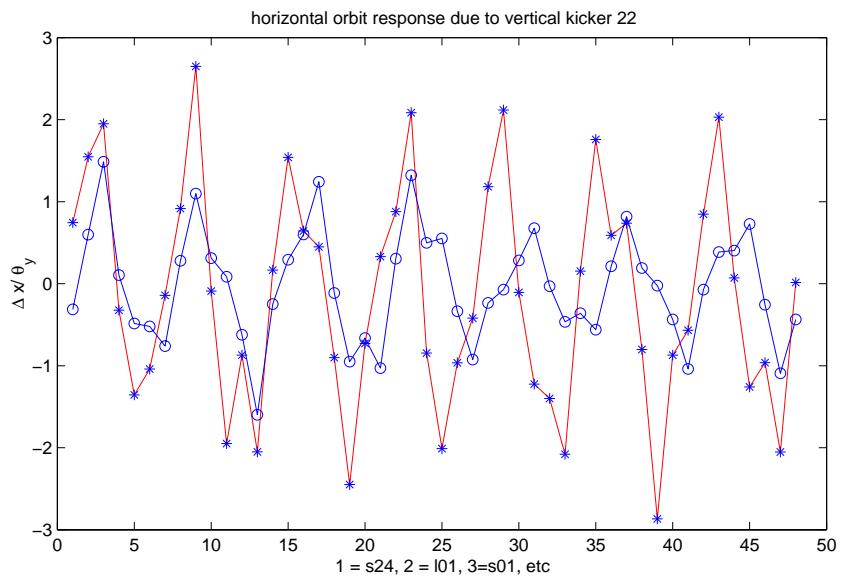
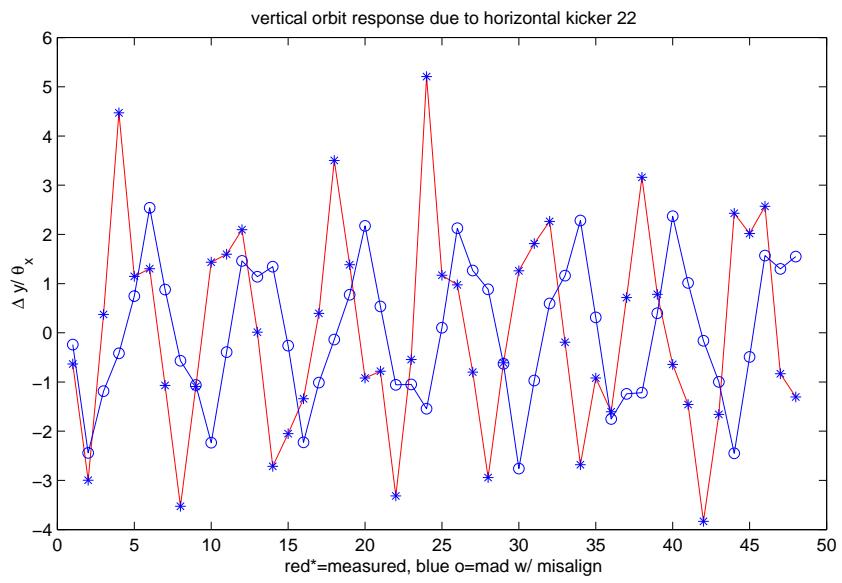
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Figure 8: Coupling of orbit response; Red * = measured, Blue o = calculated (MAD). Top, vertical orbit response due to horizontal kicker HL01, Bottom, horizontal orbit response due to vertical kicker VL01



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Figure 9: Coupling of orbit response; Red * = measured, Blue o = calculated (MAD). Top, vertical orbit response due to horizontal kicker HS10, Bottom, horizontal orbit response due to vertical kicker VS10



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Figure 10: Coupling of orbit response; Red * = measured, Blue o = calculated (MAD). Top, vertical orbit response due to horizontal kicker HL11, Bottom, horizontal orbit response due to vertical kicker VL11